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In the United States Patent and Trademark Office
Board of Patent Appeals and Interferences

In re Application of:

Ward B. Bowen, Jr., et al

Photographic Element With Light Sensitive Layer Comprising Blend Of High Chloride Emulsions Grains Doped With Different Metal Complexes

Serial No. 09/919,239

Filed 31 July 2001

Group Art Unit: 1752

Examiner: Amanda C. Walke

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Valerie J. Richardson

Valerie J. Richardson

May 29, 2003

Date

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF TRANSMITTAL

Enclosed herewith in triplicate is Appellants' Appeal Brief for the above-identified application.

The Assistant Commissioner is hereby authorized to charge the Appeal Brief filing fee to Deposit Account 05-0225. A duplicate copy of this letter is enclosed.

Respectfully submitted,

Attorney for Appellants
Registration No. 33,564

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Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF PURSUANT TO 37 C.F.R. 1.192

Applicants hereby appeal to the Board of Patent Appeals and Interferences from the Examiner's Final Rejection of claims 1-23 which was contained in the Office Action mailed December 26, 2002.

A timely Notice of Appeal (mailed by Applicants March 26, 2003, with certificate of First Class mailing) was filed and date stamped April 1, 2003 by the Patent & Trademark Office OIPE.

Respectfully submitted,

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Table Of Contents

Real Party In Interest

The Eastman Kodak Company is the assignee and the real party in interest.

Related Appeals And Interferences

No appeals or interferences are known which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

Status Of The Claims

Claims 1-23 are pending in the application.

Claims 1-23 stand rejected under 35 USC § 103.

Claims 1-23 are being appealed.

Appendix I provides a clean, double spaced copy of the claims on appeal.

Status Of Amendments

No amendments to the claims have been filed subsequent to final rejection.

A request for reconsideration of the final rejection was filed February 25, 2003, and an Advisory Action dated March 17, 2003 was received stating that Applicant's arguments have been considered but does not place the application in condition for allowance.

Summary Of The Invention

In accordance with the present invention as set forth in claim 1, photographic elements are described which comprise at least one radiation-sensitive emulsion layer comprising silver halide grains containing greater than 50 mole percent chloride, based on silver, and having greater than 50 percent of surface area provided by {100} crystal faces, which emulsion layer comprises (i) a first fraction (10-90 wt%) of the silver halide grains which have a central portion having at least 10^{-7} mole of a dopant of Formula (I) (page 8, lines 17-24) per mole of silver and less than 10^{-10} mole of a dopant of Formula (II) (page 8, lines 25-31) per mole of silver and (ii) a

second fraction (10-90 wt%) of the silver halide grains which have a central portion having at least 10^{-10} mole of a dopant of Formula (II) per mole of silver and less than 10^{-7} mole of a dopant of Formula (I) per mole of silver.

The present invention addresses a particular problem found in the photographic art wherein the use of a combination of known types of dopants (i.e., speed enhancing dopants of Formula (I) and contrast improving dopants of Formula (II)) at sufficiently high levels in radiation-sensitive silver halide emulsion grains which are desirable for design of characteristic curve shapes of color photographic paper elements can also result in latent image keeping instability problems, particularly for electronic printing laser exposures (page 7, lines 15-20). Latent image keeping (LIK) instability refers to a highly undesirable property of changing photographic performance as a function of the time that elapses between exposure and processing (page 7, lines 20-22). By specifically requiring that the two classes of dopants be differentially employed in separate fractions of silver halide grains (i.e., dopant of Formula (I) at a higher level in a first fraction relative to that employed in a second fraction, and dopant of Formula (II) at a higher level in the second fraction relative to that employed in the first fraction) and then employing such differentially doped fractions together in a common emulsion layer, Applicants have found that improved LIK performance is achieved for optical and digital exposed elements which comprise such differentially doped grains relative to where such dopants are employed at the higher levels in the same grains of the emulsion layer, while substantially maintaining desired relatively soft toe and dynamic range parameters (page 9, lines 7-12). Thus, the photographic elements of the present invention surprisingly enable the use of a desired combination of contrast and speed improving dopants in silver halide emulsions with improved latent image keeping performance in photographic elements comprising such emulsions.

In another specific aspect, this invention is directed to an electronic printing method which comprises subjecting a radiation sensitive silver halide emulsion layer of a recording element to actinic radiation of at least 10^{-4} ergs/cm^2 for up to 100 μ seconds duration in a pixel-by-pixel mode (page 22, lines 7-13), wherein the silver halide emulsion layer is comprised of differentially doped first and second fractions of silver halide grains as described in claim 1.

Issues For Review By The Board

There are 2 issues presented for review by the Board of Patent Appeals and Interferences:

1. Are Claims 1-18 properly rejected under 35 USC § 103(a) as being unpatentable over Makuta et al (5,683,853) in view of Newmiller et al (4,865,964) and McDugle et al (4,933,272) and Keevert, Jr et al (4,945,035)?

2. Are Claims 19-23 properly rejected under 35 USC § 103(a) as being unpatentable over Makuta et al in view of Newmiller, McDugle et al, Keevert, Jr, and Research Disclosure 437013?

Grouping Of Claims

With respect to the rejection of Claims 1-18 under 35 USC § 103(a) as being unpatentable over Makuta et al (5,683,853) in view of Newmiller et al (4,865,964) and McDugle et al (4,933,272) and Keevert, Jr et al (4,945,035), such claims 1-18 may stand or fall as a single group.

With respect to the rejection of Claims 19-23 under 35 USC § 103(a) as being unpatentable over Makuta et al in view of Newmiller, McDugle et al, Keevert, Jr, and Research Disclosure 437013, such claims 19-23 may stand or fall as a single group.

Arguments

The Rejection of Claims 1-18

The rejection of Claims 1-18 under 35 USC § 103(a) as being unpatentable over Makuta et al (5,683,853) in view of Newmiller et al (4,865,964) and McDugle et al (4,933,272) and Keevert, Jr et al (4,945,035) is improper, as The Examiner has failed to establish a prima facie obviousness position, as there is no teaching or suggestion in any of the cited art to employ any specific dopants at different levels in different grain fractions of an emulsion layer for any reason, let alone to obtain improved LIK performance in accordance with the invention.

As explained by Applicants in the background of the invention, the use of transition metal complex dopants containing a nitrosyl or thionitrosyl ligand (such as those disclosed in McDugle et al) in combination with shallow electron trapping dopants (such as those disclosed in Keevert et al) in high chloride emulsions has been found to enable desirable characteristic curve shapes for digital printing of color photographic paper elements. The present invention addresses a particular problem found, however, that such combination of dopants in silver halide grains can also result in latent image keeping instability problems, particularly for electronic printing laser exposures. Latent image keeping (LIK) instability refers to a highly undesirable property of changing photographic performance as a function of the time that elapses between exposure and processing. By specifically requiring that each of the two classes of dopants be used primarily in separate fractions of silver halide grains of an emulsion layer, Applicants have found that improved LIK performance is achieved relative to where both such dopants are employed primarily together in the same grains. Thus, the photographic emulsion layers of the elements of the present invention surprisingly enable the use of a desired combination of contrast and speed improving dopants with improved latent image keeping performance.

The Examiner has failed to establish a prima facie obviousness position, as there is no teaching or suggestion in any of the cited art to employ any specific dopants at different levels in different grain fractions of an emulsion layer in accordance with the invention for any reason, let alone to improve LIK performance. While Makuta et al discloses a variety of grain halide compositions (including but not limited to high chloride), forms, doping, and mixing possibilities for the emulsions of the photographic materials described therein, there simply is no teaching or suggestion to differentially dope separate fractions of grains of a high chloride {100} grain emulsion in accordance with the present invention. The Examiner's reliance upon the reference to Newmiller et al in Makuta et al as a teaching that the high chloride grains of Makuta et al should be differentially doped and that it would have been obvious to perform such differential doping with dopants as described in McDugle et al and Keevert et al in accordance with the invention clearly is arrived at only with the impermissible use of hindsight. In such regard, it is specifically noted that contrary to the Examiner's statements that the blended emulsions of Newmiller are only "preferred" to be directed to silver bromide or iodobromide grains, the invention

described in Newmiller et al is in fact limited thereto (see, e.g., the Abstract; Summary of the Invention (col. 1, lines 58-60 and col. 2, lines 1-3); Detailed Description (col. 2, lines 9-11, col. 3, lines 24-27, etc.); and Claims (claim 1, lines 7-8)). Thus, based on this point alone, the proposed combination of Makuta et al in view of and Newmiller et al would not be pertinent to the present claimed invention directed towards high chloride emulsions, and clearly is only suggested in hindsight based on Applicant's teachings.

Further, even if the teachings of Newmiller et al were assumed to apply to high chloride emulsion which may be employed in Makuta et al, there is in any event clearly no support for the Examiner's reference to Newmiller at col. 64, lines 14-16 of Makuta et al. as providing "a teaching or suggestion to one of ordinary skill in the art to prepare an emulsion containing two grain fractions of different forms, each which may be doped independently". Applicant continues to believe that such interpretation of what Makuta et al. actually intended "different forms" to describe as proposed by the Examiner is highly questionable in view of the fact that such "different forms" reference is found only in the paragraph at col. 64 lines 5-30, which is specifically directed towards different possible crystal grain forms, rather than independent dopant possibilities, combined with the fact that the primary teaching of Newmiller itself (and only actual requirement) is directed towards blending of emulsions grains having different aspect ratios. A detailed review of Newmiller reveals that the only "example" of mixing grains having different forms (as specifically referenced at col. 64, lines 14-15 of Makuta et al.) actually disclosed in Newmiller is that of the blending of emulsions of different aspect ratios. There simply is no example of blending of independently doped emulsions which would correspond to the referenced "example of mixing grains" cited in Makuta et al. While it is stated the blended emulsions grains of different aspect ratios may possibly have additional differences, such differences are secondary to the basic requirement of blending of grains of different aspect ratios. Thus, while the blended emulsion grains of Newmiller may be open to the possibility that they may be differentially doped, there is no explicit teaching to do so which could be reasonably interpreted as what the reference to Newmiller found in Makuta et al. was intended to suggest. To the contrary, while Newmiller states at col. 4, lines 17-19 that "one" of the blended emulsions can be doped (which is apparently the statement which the Examiner relies

upon as providing any teaching regarding independent doping), such statement also clearly states that it is preferred that both of the blended emulsion be doped, which in actuality would appear to be a teaching of a general preference away from any type of independent doping for the blended emulsions of different aspect ratios. Thus, the only reasonable interpretation of what teaching of Newmiller was actually intended to be referred to at col. 64 of Makuta et al. would be only with respect to the blending of grains of different aspect ratios as actually taught by Newmiller. In view of such detailed review, it is clear that any possible "extension" of the specific referenced example of Newmiller to provide motivation to independently dope separate grain fractions of a blended emulsion in order to support an "obviousness" rejection of the present claimed invention would again only be arrived at in hindsight based on Applicants' teachings.

While the basic combination of Makuta et al and Newmiller et al as proposed by the Examiner in relation to the present invention is clearly improper as discussed above, the Examiner has additionally failed to provide any explanation as to motivation found in the cited art to dope separate fractions of the emulsion grains individually specifically with the dopants of the Keevert and McDugle references. The mere possibility that individual teachings of the prior art could be combined to arrive at the claimed invention does not equate to establishing that it would have been obvious to the artisan to do so. Applicants do not contest that the combination of such references may *prima facie* suggest to one of ordinary skill to combine an additive that provided high contrast but also decreased the speed (sensitivity) with an additive that would increase the speed to even out the sensitivity as suggested by the Examiner. This is in fact what has been done in co-doped silver halide grains of the prior art as described at page 7 of the present specification. This is also, however, what has lead to the LIK problem addressed by the present invention. There is no explanation provided by the Examiner, however, as to why it would have been obvious to the skilled artisan to employ such dopants independently in separate grain fractions, rather than together in the same grains to obtain the combined effects, which is actually how such dopants have been used in the prior art (see, e.g., USPs 5,783,373 and 5,783,378 referenced at page 7, lines 8-14 of the specification). The Examiner apparently attempts to rely on the teaching of Newmiller as providing motivation to employ such dopants independently as opposed to in the same grains. As explained above,

however, while Newmiller may be open to such possibility of independent doping, it fails to provide any specific motivation to employ the specified two types of dopants independently in separate grain fractions for any reason. To the contrary, if anything, Newmiller would appear to teach equivalent doping of the blended emulsion grains of different aspect ratios taught therein, as it is stated at col. 4, lines 17-19 that it is preferred both emulsions are doped to form internal latent image as noted above. Clearly, it is only Applicants' teaching with respect to improved latent image keeping results that provides the motivation to independently dope separate grain fractions in accordance with the claimed invention, and the Examiner has improperly selected only portions of the cited art to be combined in an attempt to arrive at the presently claimed invention without providing any motivation to do so. Reversal of this rejection is accordingly respectfully requested.

The Rejection of Claims 19-23

The rejection of Claims 19-23 under 35 USC § 103(a) as being unpatentable over Makuta et al in view of Newmiller, McDugle et al, Keevert, Jr, and Research Disclosure 437013 is improper, as the presently claimed photographic elements are not obvious over the combination of Makuta et al in view of Newmiller, McDugle et al, and Keevert, Jr. et al. Thus, electronic printing as disclosed by Research Disclosure of "the material of Makuta et al in view of Newmiller, McDugle et al, Keevert, Jr. et al" as proposed by the Examiner would not result in the presently claimed invention. Reversal of this rejection is accordingly respectfully requested.

Summary

By specifically requiring that each of the two specified classes of dopants of Formula (I) and Formula (II) be used primarily in separate fractions of silver halide grains of an emulsion layer, Applicants have found that improved LIK performance is achieved relative to where both such dopants are employed primarily together in the same grains. Thus, the photographic emulsion layers of the elements of the present invention surprisingly enable the use of a desired combination of contrast and speed improving dopants with improved latent image keeping performance. The Examiner has failed to specifically state where any motivation may be found in the cited art to combine the references as proposed in order to arrive at the

inventive teaching of improved latent image keeping performance relative to the actual prior art use of the described combination of dopants as noted above, rather than simply note that the blended emulsions of Newmiller "may" be independently doped by unspecified dopants. As the claimed invention and improved results are not suggested by any reasonable combination of teachings based on the cited prior art, the claimed invention is accordingly believed to be clearly patentable thereover.

Conclusion

For the above reasons, Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the rejection by the Examiner and mandate the allowance of Claims 1-23.

Respectfully submitted,

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Appendix I - Claims on Appeal

1. A photographic element comprising a support bearing at least one radiation-sensitive silver halide emulsion layer comprising silver halide grains containing greater than 50 mole percent chloride, based on silver, and having greater than 50 percent of their surface area provided by {100} crystal faces, wherein

(i) a first fraction which comprises from 10-90 wt% of the silver halide grains, based on total radiation-sensitive silver halide in the layer, consists of grains which have a central portion accounting for up to 99 percent of total silver which contains at least 10^{-7} mole of a hexacoordination metal complex which satisfies formula (I) per mole of silver and less than 10^{-10} mole of a hexacoordination metal complex which satisfies formula (II) per mole of silver, and

(ii) a second fraction which comprises from 10-90 wt% of the silver halide grains, based on total radiation-sensitive silver halide in the layer, consists of grains which have a central portion accounting for up to 99 percent of total silver which contains at least 10^{-10} mole of a hexacoordination metal complex which satisfies the formula (II) per mole of silver and less than 10^{-7} mole of a hexacoordination metal complex which satisfies the formula (I) per mole of silver:

(I) $$[ML_6]^n$$

wherein n is zero, -1, -2, -3 or -4,

M is a filled frontier orbital polyvalent metal ion, other than iridium, and

L_6 represents bridging ligands which can be independently selected, provided that at least four of the ligands are anionic ligands, and at least one of the ligands is a cyano ligand or a ligand more electronegative than a cyano ligand;

6. An element according to claim 1 wherein the second fraction of silver halide grains contains from 10^{-10} to 10^{-7} mole of a hexacoordination metal complex of Formula (II) per mole of silver.

7. An element according to claim 6 wherein the second fraction of silver halide grains contains from 10^{-9} to 10^{-8} mole of a hexacoordination metal complex of Formula (II) per mole of silver.

8. An element according to claim 1 wherein M represents an Fe^{+2}, Ru^{+2}, Os^{+2}, Co^{+3}, Rh^{+3}, Pd^{+4}, or Pt^{+4} ion.

9. An element according to claim 1 wherein M represents an iron, ruthenium or osmium ion.

10. An element according to claim 1 wherein M represents a ruthenium ion.

11. An element according to claim 10 wherein T represents an osmium ion.

12. An element according to claim 1 wherein T represents an osmium ion.

13. An element according to claim 1 wherein the dopant of Formula (I) is $[Ru(CN)_6]^{-4}$ and the dopant of Formula (II) is $[Os(NO)Cl_5]^{-2}$.

14. An element according to claim 1 wherein the silver halide grains contain at least 70 mole percent chloride, based on silver.

15. An element according to claim 1 wherein the silver halide grains contain less than 5 mole percent iodide, based on silver.

16. An element according to claim 15 wherein the silver halide grains contain less than 2 mole percent iodide, based on silver.

17. An element according to claim 1 wherein in the first fraction of silver halide grains the dopant of Formula (I) is located within the central portion of grains in a concentration of from 10^{-8} to 10^{-3} mole per mole of silver, and in the second fraction of silver halide grains the dopant of Formula (II) is located within the central portion of the grains in a concentration of from 10^{-10} to 10^{-7} mole per mole of silver.

18. An element according to claim 1 wherein each of the bridging ligands of the dopant of Formula (I) are at least as electronegative as cyano ligands.

19. An electronic printing method which comprises subjecting the radiation sensitive silver halide emulsion layer of a recording element according to claim 1 to actinic radiation of at least 10^{-4} ergs/cm^2 for up to 100 μ seconds duration in a pixel-by-pixel mode.

20. A method according to claim 19 wherein the pixels are exposed to actinic radiation of about 10^{-3} ergs/cm^2 to 10^2 ergs/cm^2.

21. A method according to claim 19 wherein the exposure is up to 10 µ seconds.

22. A method according to claim 19 wherein the source of actinic radiation is a light emitting diode.

23. A method according to claim 19 wherein the source of actinic radiation is a laser.

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